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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/788,657

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Lei Shao

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INTEL/BSTZ

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EXAMINER

MURPHY, RHONDA L

ART UNIT

PAPER NUMBER

2416

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/788,657	Applicant(s) SHAO ET AL.	
	Examiner RHONDA MURPHY	Art Unit 2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This communication is responsive to the amendment filed on 8/11/08. Accordingly, claims 1-29 have been previously canceled and claims 30-44 are currently pending in this application.

Response to Arguments

1. Applicant's arguments filed 8/11/08 have been fully considered but they are not persuasive. Applicant's argue Lee states that a unity coding rate cannot be used with higher order (i.e., more than two antennae) complex orthogonal block codes. However, Examiner respectfully disagrees. Lee's passage states "...it is not clear whether using higher order transmitter diversity directly or applying other error correction codes (ECC) on top of the second order transmitter diversity system will achieve better overall performance." Thus, Lee's statement does not exclude using more than two antennas. Furthermore, the newly cited Hottinen reference discloses more than two antennas in Figure 3; TX1, TX2...TXnt.

2. Thus, it is Examiner's position that the claim limitations have been met and the rejection has been maintained.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claim 30 - 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. ("A Space-Frequency Transmitter Diversity Technique for OFDM systems", Globecom 2000, IEEE Global Telecommunications Conference; November 27, 2000) in view of Giannakis et al. (US 7,224,744) and Hottinen et al. (US 2005/0078761 A1).

Regarding claims 30, 35 and 40, Lee teaches a system comprising: a number M of omnidirectional antennas (*Tx1 and TX2 in fig. 2*); and a diversity agent, to receive content for transmission via a multicarrier wireless communication channel (*X(m) in fig. 2. It would be inherent to have a receiver to receive the symbol*), wherein the received content is a vector of input symbols (s) of size $N_c \times 1$ (*pg. 1474, right column, first paragraph*), wherein N_c is the number of subcarriers of the multicarrier wireless communication channel (*equation (1), $X_0(n)-X_{I^*}(n) \dots X_{N-2}(n)-X_{N-1^*}(n)$ and $X_I(n) \dots X_{N-2''}(n)$ are interpreted to be corresponding to the number of subcarriers*), and to generate

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a rate-one (*equation (1) on pg. 1474*), space-frequency code matrix (*matrix G2 on pg. 1474*) from the received content for transmission on the multicarrier wireless communication channel from at least a subset of the M omnidirectional antennas (*Tx1 and Tx2 in fig. 2*).

Lee fails to explicitly disclose dividing the vector of input symbols into a number G of groups to generate subgroups and multiplying at least a subset of the subgroups by a constellation rotation precoder to produce a number G of pre-coded vectors (V_g), wherein successive symbols from the same group transmitted from the same antenna are at a frequency distance that is multiples of NG subcarrier spacings.

However, Giannakis teaches dividing the vector of input symbols into a number G of groups to generate subgroups and multiplying at least a subset of the subgroups by a constellation rotation precoder to produce a number G of pre-coded vectors (V_g) (col.9, lines 1-15; col. 10, lines 15-23), wherein successive symbols from the same group transmitted from the same antenna are at a frequency distance that is multiples of NG subcarrier spacings (col. 10, lines 24-42).

In view of this, it would have been obvious to one skilled in the art to divide the symbols into groups and multiply by a constellation rotation precoder, in order to maximize the signal level at the antenna.

Lee fails to explicitly teach wherein M comprises more than two omnidirectional antennas.

However, Hottinen discloses more than two omnidirectional antennas (Fig. 3; TX1, TX2...TX_{nt}).

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In view of this, it would have been obvious to one skilled in the art to modify Lee's system to include more than two omnidirectional antennas, for the purpose of achieving channel diversity in the system (page 1, paragraph 2).

Regarding claims 31, 36 and 41, the combined system of Lee and Giannakis teach a system according to claim 40. Giannakis further teaches the diversity agent further comprising: a space-frequency encoding element, responsive to the pre-coder element, to divide each of the pre-coded vectors into a number of $L \times 1$ subvectors, and to create an $M \times M$ diagonal matrix $= D_{sg,k} = \text{diag}\{\Theta^T M^* \times (k-1) + 1 S_g, \dots, \Theta^T M^* k S_g\}$, where $k=1 \dots L$ from the subvectors (col. 9, lines 45-60; col. 10, lines 15-23).

Regarding claims 32, 37 and 42, the combined system of Lee and Giannakis teach a system according to claim 40. Giannakis further teaches a system according to claim 41, wherein the space-frequency encoding element interleaves the L submatrices from the G groups to generate an $M \times N_c$ space-frequency matrix (col. 9, lines 32-55).

Regarding claims 33, 38 and 43, Lee teaches a system according to claim 42, wherein the space-frequency matrix provides MNL channel diversity (pg. 1477, section V in Lee. Two-branch SF-OFDM transmitter diversity), while preserving a code rate of 1 for any number of transmit antenna(s) M , receive antenna(s) N and channel tap(s) L (pg. 1477, section V. Unity coding rate is interpreted as a code rate of 1).

Regarding claims 34, 39 and 44, Lee teaches a system according to claim 40, wherein the space-frequency matrix provides MNL channel diversity (pg. 1477, section V in Lee. Two-branch SF-OFDM transmitter diversity), while preserving a code rate of 1 for any

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number of transmit antenna(s) M, receive antenna(s) N and channel tap(s) L (pg. 1477, section V. Unity coding rate is interpreted as a code rate of 1).

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RHONDA MURPHY whose telephone number is (571)272-3185. The examiner can normally be reached on Monday - Friday 9:00 - 5:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Firmin Backer can be reached on (571) 272-6703. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Rhonda Murphy
Examiner
Art Unit 2416

/R. M./
Examiner, Art Unit 2416

/FIRMIN BACKER/
Supervisory Patent Examiner, Art Unit 2416